

# **APPENDIX A**

## **List of Preparers**

## LIST OF PREPARERS

### Primary Authors

**Thomas J. Suk**, Associate Land and Water Use Analyst in the Regional Board's South Lake Tahoe Office, holds a B.S. degree in soil and water science from U.C. Davis. Mr. Suk has nine years of experience in federal and state service as a Hydrologist, Soil Conservationist, and Environmental Specialist. He has authored several scientific papers on water quality topics. Mr. Suk played a major role in editing and formatting the Basin Plan, and in coordinating preparation of the final draft.

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**Cindy M. Wise**, Sanitary Engineering Associate in the Regional Board's South Lake Tahoe Office, holds a M.S. in natural resources from Humboldt State University, with B.S. degrees in both environmental resources engineering (Humboldt State University) and biological sciences (U.C. Irvine). Ms. Wise has over eleven years of experience in water quality and related environmental fields with state, federal and private agencies, including seven years with the Regional Board. She was the primary author of Chapter 3, and also wrote major portions of Chapter 4, including sections on ground water protection and management, and resources management and restoration.

### Contributing Authors

**Cheryl A. Blatt**, Sanitary Engineering Associate in the Regional Board's South Lake Tahoe Office, holds a B.S. degree in environmental resources engineering from Humboldt State University with an emphasis in water quality. Her duties with the Regional Board have included review of timber harvest activities, review of environmental documents, and management of water quality mitigation funds and community construction grants. She contributed to Basin Plan sections on timber harvests, fire control, and reservoir management.

**Fred J. Blatt**, Environmental Specialist III in the Regional Board's South Lake Tahoe Office, holds a M.S. degree in ecology and a B.S. degree in limnology, both from U.C. Davis. He has eight years of experience with the State and Regional Boards, including six years at the Lahontan Region. Mr. Blatt leads the Nonpoint Source Program at the Regional Board; his duties include basin planning and policy development for nonpoint source control, as well as review of timber harvest and grazing activities, oversight of erosion control projects, and management of various water quality mitigation funds. He contributed to several sections of the Basin Plan related to nonpoint sources of pollution, and supervised production of the plan's many figures and tables.

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**Jason J. Churchill**, formerly an Environmental Specialist III in the Regional Board's South Lake Tahoe Office, holds a B.S. degree in biochemistry from U.C. Davis. During his five years with the Regional Board, he worked on basin planning, pollution abatement projects, and various water quality studies. He contributed to Chapter 2, and also wrote sections on agriculture and fisheries management.

**Rick Cooper**, formerly a student intern at the Regional Board's South Lake Tahoe Office, holds a B.S. in environmental science with a minor in fine arts from Sierra Nevada College. Mr. Cooper prepared many of the figures (maps & illustrations) contained in this Basin Plan. He currently works as a freelance illustrator in Incline Village, Nevada.

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Wisconsin, both in chemical engineering. Mr. Kratzke has over seven years of experience in the environmental field, including hazardous waste disposal and cleanup. At the Regional Board, he works in regulation and enforcement.

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**Eric J. Taxer**, formerly an Associate Water Resource Control Engineer in the Regional Board's South Lake Tahoe Office, holds a B.S. degree in civil engineering from Oregon State University. His experience includes toxic cleanup of petroleum product releases and acid mine drainage discharges. He was a member of an interdisciplinary team to Russia and Estonia to evaluate surface mining reclamation practices in those countries.

**Bruce T. Warden**, Environmental Specialist II in the Regional Board's South Lake Tahoe Office, holds a Ph.D. in soil science from U.C. Davis. His duties with the Regional Board include supervision of in-house laboratory operations and management of external laboratory contracts, review and development of water quality criteria for basin planning, management of marina dredging impact studies, and revegetation of abandoned mine sites. Dr. Warden also serves as an information resource person for Regional Board staff on water chemistry and soil chemistry issues.

**Additional Acknowledgements.** In addition to the contributors above, technical and management staff at both offices reviewed the preliminary draft Basin Plan and offered many constructive comments. Administrative staff at the South Lake Tahoe office were responsible for photocopying and mailing. The tables were prepared by interns Thomas Gill, Ward Nimmo, and Juan Ramos.

# APPENDIX B

## Copies of State and Regional Board Policies Which Are Used In Basin Plan Implementation

### State Board Policies

Sources of Drinking Water Policy  
(Resolution 88-63)

Certification of TRPA's 208 Plan  
(Resolution 89-32)

State Board Policy for Water Quality Control  
(part of Resolution 72-45)

Thermal Plan  
(Resolution 75-89)

Statement with Respect to Maintaining High  
Quality Water (Resolution 68-16)

Policy Regarding Power Plant Cooling Water  
(Resolution 75-58)

Policy Regarding Water Reclamation  
(Resolution 77-1)

Policy Regarding Shredder Wastes  
(Resolution 87-22)

Policy Regarding Cleanup and Abatement  
(Resolution 92-49)

### Regional Board Policies

Policy Delegating Authority to the Executive  
Officer (Resolution 6-90-72)

Policy Delegating Authority to the Executive  
Officer to Approve Closure Plans for Waste  
Management Units (Resolution 6-91-927)

Waiver Policy  
(Resolution 6-88-18)

Variance to Prohibition of New Septic Tank  
Subdivisions in the Truckee River Hydrologic  
Unit (Order 6-81-7)

Regarding Sewage Export Variance, Lake  
Tahoe Basin (Resolution 6-70-48)

Regarding Sewage Export Variance, Lake  
Tahoe Basin (Resolution 6-71-17)

Regarding Sewage Export Variance, Lake  
Tahoe Basin (Resolution 6-74-139)

Exemption Criteria to Prohibitions for Specific  
Circumstances (Order 6-90-22)

Exemption Criteria to Prohibitions Regarding  
Discharges of Earthen Materials to Floodplains  
and Stream Environment Zones  
(Order 6-93-08)

Offset Mitigation Policy  
Resolution (82-4)

Interpretation of High Water Line for Eagle Lake  
(Resolution 82-6)

Policy on Geothermal Development in Eagle  
Lake Basin (Resolution 82-7)

# **APPENDIX C**

## **Regional Board Guidelines for Implementation of Criteria for Individual Waste Disposal Systems**

REGIONAL BOARD GUIDELINES FOR IMPLEMENTATION  
OF CRITERIA FOR INDIVIDUAL WASTE DISPOSAL SYSTEMS

The following guidelines will be used by the Executive Officer to : (1) implement the 1988 Amendments to the Water Quality Control Plans for the North and South Lahontan Basins Concerning the Criteria for Individual Waste Disposal Systems and (2) consider exemptions to the maximum density criteria (2 EDU's per acre) for individual waste disposal systems.

Terms, such as "existing land development", are defined in a Definition List included in the 1988 Amendments to the Water Quality Control Plans for the North and South Lahontan Basins Concerning the Criteria for Individual Waste Disposal Systems.

I. GENERAL IMPLEMENTATION

- A. Once a local agency has agreed to implement the Regional Board Criteria for Individual Waste Disposal Systems, applications for the use of individual waste disposal systems which meet the Regional Board criteria and are for domestic waste discharges from residential, recreational, commercial and industrial developments shall be processed entirely by the local agency.
- B. Applications for the use of individual waste disposal systems for discharges of industrial waste from recreational, commercial and industrial developments shall be reviewed by the Executive Officer, and a Report of Waste Discharge including filing fee may be required.
- C. If requested by the local agency and/or discharger, applications for land developments which do not meet the minimum criteria will be reviewed by the Executive Officer for consideration of granting an exemption (see Sections II through V below). If an area-wide exemption is granted, individual applications in these areas will be processed by the local agency.
- D. The Regional Board retains the authority to review proposals for all other types of waste discharges (such as stormwater runoff and solid waste) from land developments and issue waste discharge requirements, if appropriate.

II. GENERAL PROVISIONS APPLICABLE TO ALL EXEMPTIONS

- A. The Executive Officer will consider granting exemptions to the maximum density criteria (2 EDU's per acre) contained in the Criteria for Individual Waste Disposal Systems. Exemptions may be granted if:
  - 1. The area beneath the proposed septic system discharge has no significant amount of groundwater having present or future beneficial uses; or

2. It can be proven that no pollution, nuisance or unreasonable degradation of either surface or groundwaters will occur as a result of the proposed septic system density when considered individually or cumulatively with other discharges in the area; or
3. Construction of a community collection, treatment and disposal system is imminent. Short term, interim use of individual waste disposal systems may be allowed.

B. The following provisions apply to all exemptions:

1. Exemptions can be granted for individual persons, small communities, distinct portions of larger communities, or distinct groundwater basins or portions, thereof.
2. Exemptions will normally be granted by the Executive Officer. However, exemptions can be taken to the Regional Board for its consideration. This would normally occur if the exemption applies to a large area or is considered controversial. Decisions of the Executive Officer may be appealed to the Regional Board.
3. For an exemption to the minimum lot size requirements to be granted, all other applicable siting criteria (e.g. depth to groundwater, percolation rate, soil type, minimum distances, etc.) must be met.
4. Environmental documentation pursuant to the California Environmental Quality Act (CEQA) (Public Resources Code 21000, et. seq.) may be required as part of the application for exemptions.

III. PROVISIONS FOR EXEMPTIONS FOR CONSTRUCTION OF INDIVIDUAL WASTE DISPOSAL SYSTEMS FOR SINGLE FAMILY UNITS IN EXISTING LAND DEVELOPMENTS

- A. The local agency and/or discharger will supply the Executive Officer with the available information on Items numbered 1 through 6 of Attachment 1. After review, the Executive Officer may request the discharger to supply more detailed information on any or all items in Attachment 1, if necessary.
- B. In addition to the information submitted by the local agency and/or discharger, the information listed in Attachment 2 will be considered by the Executive Officer.
- C. The Executive Officer will review the above information as it pertains to existing and potential water quality impacts.
  1. If any of the general provisions for granting exemptions as outlined in II. A. of these guidelines are met, exemptions may be granted.



2. If none of the general provisions for granting exemptions as outlined in II.
  - A. of these guidelines are met, exemptions will not be granted.

IV. PROVISIONS FOR EXEMPTIONS FOR CONSTRUCTION OF INDIVIDUAL WASTE DISPOSAL SYSTEMS FOR MULTI-FAMILY UNITS, COMMERCIAL, RECREATIONAL AND INDUSTRIAL DEVELOPMENTS IN EXISTING LAND DEVELOPMENTS

- A. The local agency and/or discharger shall submit to the Executive Officer information on Items 1-9 listed in Attachment 1 in as much detail as possible.
- B. In addition to the information submitted by the local agency and/or discharger, the information listed in Attachment 2 will be considered by the Executive Officer.
- C. The Executive Officer will conduct an initial review of the above information and determine if a Report of Waste Discharge (including filing fee) is required.
- D. The Executive Officer will conduct a comprehensive review of the submitted information as it pertains to existing and potential water quality impacts.
  1. If any of the general provisions for granting exemptions as outlined in II.
    - A. of these guidelines are met, exemptions may be granted.
  2. If none of the general provisions for granting exemptions as outlined in II.
    - A. of these guidelines are met, exemptions will not be granted.

V. PROVISIONS FOR EXEMPTIONS FOR NEW LAND DEVELOPMENT

- A. The local agency and/or discharger shall submit to the Executive Officer a complete Report of Waste Discharge, including filing fee, and detailed information on Items 1 through 9 of Attachment 1.
- B. In addition to the information submitted by the local agency and/or discharger, the information listed in Attachment 2 will be considered by the Executive Officer.
- C. The Executive Officer will review the submitted information as it pertains to existing and potential water quality impacts.
  1. If any of the general provisions for granting exemptions as outlined in II.
    - A. of these guidelines are met, exemptions may be granted. Waste discharge requirements may be adopted by the Regional Board.

2. If none of the general provision for granting exemptions as outlined in II.
  - A. of these guidelines are met, exemptions will not be granted.

VI. RESCISSION OF EXEMPTIONS

A. Exemptions will be rescinded if:

1. It appears that water quality or the beneficial uses of waters are threatened or degraded or if a nuisance, pollution or contamination is caused or threatened; or
2. Any condition of the exemption is violated.

B. No discharge of waste into the waters of the state, whether or not such discharge is made pursuant to waste discharge requirements, shall create a vested right to continue such discharge. All discharges of waste into waters of the state are privileges, not rights. (Water Code Section 13263 (g))

ATTACHMENT 1

ITEMS TO BE SUBMITTED TO THE REGIONAL BOARD FOR REVIEW

1. Number, size and location of improved lots in the surrounding area (subdivision, community or portion thereof, distinct groundwater basin or portion thereof) being considered for exemption.
2. Number, size and location of unimproved lots in the area being considered for exemption.
3. Availability of sewerage or connection to other secondary wastewater treatment facility.
4. Surface and/or groundwater quality in the vicinity of the proposed exemptions.
5. Hydrogeologic characteristics (e.g. depth to groundwater, soil type, etc).
6. Development density and trends.
7. Assessment of historic, current and future groundwater quality impacts within and surrounding the area being considered for exemption.
8. Assessment of whether or not the wastewater discharges from the proposed development will individually or collectively, or in connection with discharges from surrounding areas, degrade the quality of, or impact beneficial uses of, surface or groundwater.
9. Other site-specific information which may aid the Regional Board in the evaluation process.

## ATTACHMENT 2

### ADDITIONAL INFORMATION TO BE CONSIDERED BY THE REGIONAL BOARD

In addition to information submitted by the local agency and/or the discharger for exemptions, the Executive Officer will consider all relevant information, including, but not limited to:

1. Water quality standards (designated beneficial uses and numerical and narrative water quality objectives) for the surface waters and/or groundwaters which could be affected by the discharge.
2. The most recent federal and state water quality criteria for chemical and biological constituents of septic system effluent.
3. The most recent technical literature on septic systems and their water quality impacts.
4. The history of water quality problems in the project area, as documented in the Regional Board's files.
5. The most recent water quality monitoring data.
6. Comments of other agencies, including any necessary consultation with the Department of Fish and Game pursuant to the California Endangered Species Act.
7. Background information on the project area from County general plans, local limnological or hydrogeological studies, etc.

## **APPENDIX D**

1. Discharges to Land Exemptions
2. Strategies for Discharge of Waste to Land
3. Geologic and Siting Criteria for Classified Waste Management Unit
4. Waste Definitions

## **APPENDIX D**

### **Discharges to Land Exemptions**

California Code of Regulations, Title 23, Chapter 15

The following activities shall be exempt from the provisions of subchapter 4.5

#### **Exemptions:**

- a) Discharges of domestic sewage or treated effluent which are regulated by waste discharge requirements issued pursuant to Subchapter 9 of this chapter, or for which waste discharge requirements have been waived, and which are consistent with applicable water quality objectives, and treatment or storage facilities associated with municipal waste water treatment plants, provided that residual sludges or solid waste from waste water treatment facilities shall be discharged only in accordance with the applicable provisions of this subchapter.
- b) Discharges of waste water to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leach fields if the following conditions are met:
  - 1) The applicable regional board has issued waste discharge requirements, reclamation requirements, or waived such issuance.
  - 2) The discharge is in compliance with the water quality objectives, set forth in the applicable water quality control plan and complies with the State Board's non degradation policy.
  - 3) The waste water does not need to be managed according to Chapter 30 of Division 4 of Title 22 of this code as a hazardous waste.

If ground water quality objectives are lacking in the applicable water quality control plan, a ground water quality evaluation on based on the ground water monitoring provisions of Article 5 of this subchapter shall be conducted by the discharger to determine if the proposed discharge would comply with the State Board's nondegradation policy.

- c) Discharges of waste to wells by injection pursuant to the Underground Injection Control Program established by the United States Environmental Protection Agency (EPA) under the Safe Drinking Water Act (42 U. S. Code Section 300h, see Title 40 of the Code of Federal Regulations, Parts 144 to 146).
- d) Actions taken by or at the direction of public agencies to clean up or abate conditions of pollution or nuisance resulting from unintentional or unauthorized releases of waste or pollutants to the environment; provided that wastes, pollutants, or contaminated materials removed from the immediate place of release shall be discharged according to Article 2 of this subchapter; and further provided that remedial actions intended to contain such wastes at the place of release shall implement applicable provisions of this subchapter to the extent feasible.
- e) Discharges of condensate from methane gas recovery operations at classified waste management units if the following conditions are met:
  - 1) Condensate shall have no chemical additives which could adversely affect containment features, and shall consist only of water and liquid contaminants removed from gas recovered at a waste management unit.
  - 2) Condensate shall be discharged to a different landfill waste management unit with a leachate collection and removal system operated under waste discharge requirements issued by the regional board, or returned to waste management unit(s) from which it came.

- 3) The discharger shall submit a report of waste discharge to the regional board pursuant to Subchapter 9 of this chapter, and shall discharge condensate only in compliance with waste discharge requirements.
- f) Use of nonhazardous decomposable waste as a soil amendment pursuant to applicable best management practices, provided that regional boards may issue waste discharge or reclamation requirements for such use.
- g) Discharges of drilling mud and cuttings from well-drilling operations, provided that such discharges are to on-site sumps and do not contain halogenated solvents. At the end of drilling operations, the discharger shall either:
  - 1) remove all wastes from the sump, or
  - 2) remove all free liquid from the sump and cover residual solid and semisolid wastes, provided that representative sampling of the sump contents after liquid removal shows residual solid wastes to be nonhazardous. If the sump has appropriate containment features, it may be reused.
- h) Recycling or other use of materials salvaged from waste, or produced by waste treatment, such as scrap metal, compost, and recycled chemicals, provided that discharges of residual wastes from recycling or treatment operations to land shall be according to applicable provisions of this subchapter.
- i) Waste treatment in fully enclosed facilities, such as tanks, or in concrete-lined facilities of limited areal extent, such as oil-water separators designed, constructed, and operated according to American Petroleum Institute Specifications.

### **Hazardous Waste**

- a) Hazardous waste is any waste which, under Section 66300 of Title 22 of this code, is required to be managed according to Chapter 30 of Division 4 of Title 22 of this code.
- b) Hazardous wastes shall be discharged only at class I waste management units which comply with the applicable provisions of this subchapter and Chapter 30 of Division 4 of Title 22 of this code unless wastes qualify for a variance under Section 66310 of Title 22 of this code.
- c) Wastes which have been designated as restricted wastes by DHS pursuant to Section 66900 of Title 22 of this code shall not be discharged to waste management units after the restriction dates established by Section 66905 of Title 22 of this code unless:
  - 1) such discharge is for retrievable storage, and
  - 2) DHS has determined that processes to treat or recycle substantially all of the waste are not available, or
  - 3) DHS has granted a variance from restrictions against land disposal of the waste under Section 66930 of Title 22 of this code.

### **Designated Waste**

- 1) nonhazardous waste which consists of or contains pollutants which, under ambient environmental conditions at the waste management unit, could be released at concentrations in excess of applicable water quality objectives, or which could cause degradation of waters of the state.
- 2) "manageable" hazardous waste which has been granted a variance from hazardous waste management requirements pursuant to Section 66310 of Title 22 of this code.

- b) Wastes in this category shall be discharged only at Class I waste management units or at Class II waste management units which comply with the applicable provisions of this subchapter and have been approved for containment of particular kind of waste to be discharged. Decomposable wastes in this category may be discharged to Class I or II land treatment units.

### **Nonhazardous Solid Waste**

- a) Nonhazardous solid waste means all putrescible and nonputrescible solid, semi-solid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-solid wastes and other discarded solid or semi-solid waste; provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state (i.e., designated waste).
- b) Except as provided in Subsection 2520(d) of this article, nonhazardous solid waste may be discharged at any classified landfill which is authorized to accept such waste, provided that:
  - 1) the discharger shall demonstrate that codisposal of nonhazardous solid waste with other waste shall not create conditions which could impair the integrity of containment features and shall not render designated waste hazardous (e.g., by mobilizing hazardous constituents);
  - 2) a periodic load-checking program approved by DHS and the regional board shall be implemented to ensure that hazardous materials are not discharged at Class III landfills.
- c) Dewatered sewage or water treatment sludge may be discharged at a Class III landfill under the following conditions, unless DHS determines that the waste must be managed as hazardous waste:
  - 1) The landfill is equipped with a leachate collection and removal system;
  - 2) The sludge contains at least 20 percent solids if primary sludge, or at least 15 percent solids if secondary sludge, mixtures of primary and secondary sludges, or water treatment sludge; and
  - 3) A minimum solids-to-liquid ratio of 5:1 by weight shall be maintained to ensure that the codisposal will not exceed the initial moisture-holding capacity of the nonhazardous solid waste. The actual ratio required by the regional board shall be based on site-specific conditions.
- d) Incinerator ash may be discharged at a Class III landfill unless DHS determines that the waste must be managed as hazardous waste.

### **Inert Waste**

- a) Inert waste does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste.
- b) Inert wastes do not need to be discharged at classified waste management units.
- c) Regional boards may prescribe individual or general waste discharge requirements for discharges of inert wastes.



APPENDIX D Strategies for Discharge of Waste to Land <sup>1</sup>					
Waste Category <sup>2,3</sup>	Waste Management Strategy	Waste Management Unit		Primary Containment <sup>4</sup>	Siting and Geologic Criteria <sup>5</sup>
		Class	Type		
Liquid Hazardous <sup>6</sup>	Full Containment	I	Surface Impoundment	Double Liners <sup>7,8</sup>	a) Natural features capable of containing waste and leachate as backup to primary containment.  b) Not located in areas of unacceptable risk from geologic or environmental hazards.
Solid Hazardous <sup>6</sup>			Landfill	Double Liners <sup>7,8</sup>	
Dry Solid Hazardous <sup>6</sup>			Waste Pile	Double Liners <sup>7,8,9</sup>	
Liquid Designated (including undewatered sludge and acceptable incinerator ash)	Full Containment	II	Surface Impoundment	Double Liners <sup>8,10</sup>	a ) Natural features capable of containing waste and leachate may satisfy primary containment requirements.  b) May be located in most areas except high risk areas.
Solid Designated			Landfill	Single Liner <sup>11,12</sup>	
Dry Solid Designated			Waste Pile		
Nonhazardous Solid Waste (including dewatered sludge and acceptable incinerator ash)	Protect Beneficial Uses	III	Landfill	None <sup>13</sup>	a) Consideration of factors listed in Subsection 2533(b) <sup>13</sup> .  b) May be located in most areas except high risk areas.

<sup>1</sup> See Sec. 2510 for applicability to existing facilities

<sup>2</sup> Waste in any category may be discharged at waste management units with higher levels of containment ability.

<sup>3</sup> Wastes suitable for land treatment in any category may be discharged at land treatment facilities.

<sup>4</sup> See Article 4 of this subchapter.

<sup>5</sup> See article 3 of this subchapter.

<sup>6</sup> "Manageable" hazardous wastes may be discharged at Class II waste

management units, see Sec. 2522(a)(2).

<sup>7</sup> Hazardous waste facility standards per 22 CAC 66630 et. seq.

<sup>8</sup> Leachate collection and removal system (LCRS) required.

<sup>9</sup> Single liner may be acceptable, See Table 4.1.

<sup>10</sup> Suitable natural features may satisfy requirements for outer liner where double liners are needed. Single replaceable clay liner (no LCRS) also acceptable.

- <sup>11</sup> Suitable natural features may satisfy primary containment requirement.
- <sup>12</sup> LCRS required as appropriate.
- <sup>13</sup> Units at sites not meeting siting and geologic criteria must have a single liner and LCRS.

## APPENDIX D

### Geologic and Siting Criteria for Classified Waste Management Units

#### Waste Management Unit Classification

Site Chara- cteristics	New Class I	Reclassification of Existing Class I <sup>1</sup>						New Class II	Reclassification of Existing Class II <sup>2</sup>	New Class III	Reclassification of Existing Class II-2 <sup>3</sup>
Geologic Setting	Maximum attainable isolation from ground water: substantial thickness, perme- ability less than or equal to 1x10 <sup>-7</sup> cm/sec.	I	I <sup>1</sup>	II-1	T/S	REC	EX	Substatntial isolation from ground water; substantial thickness, permeability less than or equal to 1x10 <sup>-6</sup> cm/sec (or liner system).	As for new Class II.	Adequate separation from ground water; characteristics other than permeability will be considered.	As for new Class III.
		Yes	Yes	Yes	Yes	Yes	Yes				
Flooding	Outside of 100-year floodplain. <sup>4</sup>	Yes	No <sup>5</sup>	No <sup>5</sup>	No <sup>5</sup>	No <sup>5</sup>	No <sup>5</sup>	No siting restriction <sup>5</sup>			
Ground Rupture	200' setback from known Holocene fault.	Yes	Yes	No <sup>5</sup>	No <sup>5</sup>	Yes	Yes	200' setback from known Holocene fault.	Exempt <sup>5</sup> , except that expansions are as for new Class II.	Not located on known Holocene fault.	Exempt <sup>5</sup> , except that expansions as new Class III.
Rapid Geologic Change	Outside subject area (potential to impair containment). <sup>4</sup>	Yes	No <sup>5</sup>	No <sup>5</sup>	No <sup>5</sup>	No <sup>5</sup>	Yes	No siting restriction <sup>5</sup>			
Tidal waves <sup>6</sup>	Outside subject coastal areas <sup>4</sup>	No siting restriction <sup>5</sup>						No siting restriction			

1 This category is defined in Subsection 2531(a) of this article.

2 This category is defined in Subsection 2532(a) of this article.

3 This category is defined in Subsection 2532(a) of this article.

4 Waste management units used only for treatment and storage may be located within prescribed areas, provided that exemption from applicable siting criteria is conditioned on protection of treatment and storage from the geologic or environmental hazards involved.

5 Exemption from siting criteria does not release dischargers from the obligation to protect waste

management units from the geologic or environmental hazards involved. Exemption is conditioned on such protection.

6 "Tidal waves" includes tsunamis, seiches, and surge condition.

# **APPENDIX E**

## **pH<sub>c</sub> Values for Adjusted Sodium Absorption (SAR) Ratios**

# TABLES FOR CALCULATING pHc VALUES & WATERS

pHc can be calculated, using the table below;  $pHc = (pK_1 - pK_2) + p(Ca+Mg) + pAlk$  where  $pK_1 - pK_2$  is obtained from  $Ca+Mg+Na$   
 $p(Ca+Mg) = \frac{p(Ca+Mg)}{2}$  " " "  $Ca+Mg$   
 $pAlk = \frac{pAlk}{2}$  " " "  $CO_3+HCO_3$

Tables for Calculation pHc

Conct. Ca+Mg+Na (mc/l)	$pK_1 - pK_2$	Conct. Ca+Mg (mc/l)	$p(Ca+Mg)$	Conct. $CO_3+HCO_3$ (mc/l)	pAlk
.5	2.11	.05	4.60	.05	4.30
.7	2.12	.10	4.30	.10	4.00
.9	2.13	.15	4.12	.15	3.82
1.2	2.14	.2	4.00	.20	3.70
1.6	2.15	.25	3.90	.25	3.60
1.9	2.16	.32	3.80	.30	3.51
2.4	2.17	.39	3.70	.40	3.40
2.8	2.18	.50	3.60	.50	3.30
3.3	2.19	.63	3.50	.63	3.20
3.9	2.20	.79	3.40	.79	3.10
4.5	2.21	1.00	3.30	.99	3.00
5.1	2.22	1.25	3.20	1.25	2.90
5.8	2.23	1.58	3.10	1.57	2.80
6.6	2.24	1.98	3.00	1.98	2.70
7.4	2.25	2.49	2.90	2.49	2.60
8.3	2.26	3.14	2.80	3.13	2.50
9.2	2.27	3.90	2.70	4.0	2.40
11	2.28	4.97	2.60	5.0	2.30
13	2.30	6.30	2.50	6.3	2.20
15	2.32	7.90	2.40	7.9	2.10
18	2.34	10.00	2.30	9.9	2.00
22	2.36	12.50	2.20	12.5	1.90
25	2.38	15.80	2.10	15.7	1.80
29	2.40	19.80	2.00	19.8	1.70
34	2.42				
39	2.44				
45	2.46				
51	2.48				
59	2.50				
67	2.52				
76	2.54				

$$pAlk = -1.001(\log CO_3 + HCO_3) + 2.998$$

Example: To calculate adj.SAR of water from

$$adj.SAR = \frac{Na}{\sqrt{\frac{Ca+Mg}{2}}} [1 + (8.4 - pHc)]$$

With report of water analysis

Na = 3.5 mc/l  
 Ca+Mg = 1.0 mc/l .54 .50 2.0 1.44  
 Ca+Mg+Na = 4.5 mc/l 5.47 5.0 2.44 1.92  
 $CO_3+HCO_3 = 3.0 mc/l$  3.18 3.2 2.36 1.00

$pHc = 2.21 + 3.30 + 2.5 = 8.01$  (from tables)

$$adj.SAR = \frac{3.5}{\sqrt{1/2}} [1 + (8.4 - 8.01)] = 4.95 (1 + .39)$$

$$adj.SAR = 6.88$$

NOTE: Values of pHc above 8.4 indicate tendency to dissolve lime from soil through which the water moves; values below 8.4 indicate tendency to precipitate lime from waters applied.

(ref: L.V. Wilcox, U.S. Salinity Laboratory, since Dec. 30, 1966)

$$pAlk = -1.035(\log CO_3 + HCO_3) + 2.998$$

or